

WEST

Generate Collection

Print

L1: Entry 26 of 43

File: USPT

Jun 2, 1998

US-PAT-NO: 5761210

DOCUMENT-IDENTIFIER: US 5761210 A

TITLE: Signal processing apparatus and method

DATE-ISSUED: June 2, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Claydon; Anthony Peter J.	Avon			GBX
Gammack; Richard J.	Avon			GBX

US-CL-CURRENT: 714/701

CLAIMS:

What is claimed is:

1. A deinterleaving circuit for processing of a signal comprising blocks of interleaved data packets represented therein, comprising:

a random access memory for memorizing a data stream of said blocks of interleaved packets, wherein a capacity of said memory does not exceed any of said blocks;

a first circuit for generating an address signal representing a sequence of addresses of said random access memory, wherein successive addresses differ by an addressing interval;

a second circuit for successively reading and writing data out of and into said random access memory respectively at a reading address and a writing address of said random access memory, said reading address and said writing address being determined by said address signal, wherein said address signal is constant during an operation comprising reading and writing data at said address; and

a third circuit responsive to a signal ACCEPT BLOCK for periodically increasing said addressing interval by a value equal to an interleaving depth of said interleaved packets wherein said signal ACCEPT BLOCK is asserted after completion of an operation comprising a complete deinterleaving of one of said blocks of data.

2. The circuit according to claim 1, wherein said first circuit comprises a row predecoder.

3. The circuit according to claim 1, wherein said random access memory, said first circuit, said second circuit, and said third circuit are integrated in a semiconductor integrated circuit.

4. The circuit according to claim 1, further comprising a control means for second circuit, wherein said second circuit operates in a selected one of a first operating mode, wherein a writing operation is enabled and a reading operation is disabled; a second operating mode, wherein said writing operation is enabled and said reading operation is enabled; and a third operating mode, wherein said writing operation is disabled and said reading operation is enabled.

5. A deinterleaving circuit for processing of a signal having blocks of interleaved data packets represented therein, comprising:

a single, non-interleaved random access memory for memorizing said interleaved packets;

a first circuit for generating an address signal representing a sequence of addresses of said random access memory, wherein successive addresses differ by an addressing interval;

a second circuit for successively reading data of a first packet out of said random access memory and successively writing data of a second packet into said random access memory; wherein said second circuit is responsive to said address signal; and

a third circuit responsive to a signal ACCEPT BLOCK for periodically increasing said addressing interval by a value equal to an interleaving depth of said interleaved packets wherein said signal ACCEPT BLOCK is asserted after completion of an operation comprising a complete deinterleaving of one of said blocks of data.

6. The circuit according to claim 5, wherein said random access memory, said first circuit, said second circuit, and said third circuit are integrated in a semiconductor integrated circuit.

7. The circuit according to claim 5, wherein said first circuit comprises a row predecoder.

8. The circuit according to claim 5, further comprising a control means for second circuit, wherein said second circuit operates in a selected one of a first operating mode, wherein a writing operation is enabled and a reading operation is disabled; a second operating mode, wherein said writing operation is enabled and said reading operation is enabled; and a third operating mode, wherein said writing operation is disabled and said reading operation is enabled.

9. A deinterleaving circuit for processing of a signal having blocks of interleaved data packets represented therein, comprising:

a non-interleaved random access memory for memorizing said interleaved packets;

a first circuit for generating an address signal representing a sequence of addresses of said random access memory, wherein successive addresses differ by an addressing interval;

a second circuit for successively reading and writing data out of and into said random access memory respectively at a reading address and a writing address of said random access memory, said reading address and said writing address being determined by said address signal, wherein said address signal is constant during an operation comprising reading and writing data at said address;

a control means for second circuit, wherein said second circuit operates in a selected one of a first operating mode, wherein a writing operation is enabled and a reading operation is disabled; a second operating mode, wherein said writing operation is enabled and said reading operation is enabled; and a third operating mode, wherein said writing operation is disabled and said reading operation is enabled; and

a third circuit responsive to a signal ACCEPT BLOCK for periodically increasing said addressing interval by a value equal to an interleaving depth of said interleaved packets wherein said signal ACCEPT BLOCK is asserted after completion of an operation comprising a complete deinterleaving of one of said blocks of data,

wherein said random access memory, said first circuit, said second circuit said third circuit, and said control means are integrated in a semiconductor integrated circuit.

WEST

Generate Collection

Print

L1: Entry 6 of 43

File: USPT

Oct 30, 2001

US-PAT-NO: 6311306

DOCUMENT-IDENTIFIER: US 6311306 B1

TITLE: System for error control by subdividing coded information units into subsets reordering and interlacing the subsets, to produce a set of interleaved coded information units

DATE-ISSUED: October 30, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
White; Gregory Charles	Schaumburg	IL		
Emeott; Stephen Paul	Rolling Meadows	IL		

US-CL-CURRENT: 714/790; 714/755

CLAIMS:

We claim:

1. A method of interleaving information units in order to provide improved error control, the method comprising the steps of:

receiving a plurality of information units;

subdividing the plurality of information units into a plurality of subsets, wherein the information units subdivided into at least one of the plurality of subsets require a lower probability of bit-error than the information units subdivided into another of the plurality of subsets;

reordering information units within each subset to produce a plurality of reordered subsets, wherein the plurality of reordered subsets comprises a first reordered subset and a second reordered subset;

interlacing at least one information unit contained in the first reordered subset with at least one information unit contained in the second reordered subset to produce interleaved coded information units;

wherein the step of subdividing comprises the steps of:

coding the information units to produce a set of coded information units; and

subdividing the set of coded information units into a plurality of subsets;

wherein the step of coding the information units comprises the steps of:

coding the information units to produce an unpunctured set of coded information units; and

puncturing the unpunctured set of coded information units to produce a set of coded information units, wherein the at least one of the plurality of subsets that requires a lower probability of bit-error than the other of the plurality of subsets is punctured less than the other of the plurality of subsets.

2. The method of claim 1, wherein the step of coding the information units comprises

the steps of:

splitting the information units into a set of codeable information units and a set of uncoded information units;

coding the set of codeable information units to produce a set of coded codeable information units; and

combining the set of coded codeable information units and the set of uncoded information units to produce a set of coded information units.

3. The method of claim 2, wherein the step of combining the set of coded codeable information units and the set of uncoded information units comprises the steps of:

puncturing the set of coded codeable information units to produce a punctured set of coded codeable information units; and

combining the punctured set of coded codeable information units and the set of uncoded information units to produce a set of coded information units.

4. A method of transmitting information units by a communication device, the method comprising the steps of:

providing information units to be transmitted;

subdividing the information units into a plurality of subsets, wherein the information units subdivided into at least one of the plurality of subsets require a lower probability of bit-error than the information units subdivided into another of the plurality of subsets;

reordering information units within each subset to produce a plurality of reordered subsets, wherein the plurality of reordered subsets comprises a first reordered subset and a second reordered subset;

interlacing at least one information unit contained in the first reordered subset with at least one information unit contained in the second reordered subset to produce interleaved coded information units;

transmitting the interleaved coded information units;

wherein the step of subdividing comprises the steps of:

coding the information units to produce a set of coded information units; and

subdividing the set of coded information units into a plurality of subsets;

wherein the step of coding information units comprises the steps of:

coding the information units to produce an unpunctured set of coded information units; and

puncturing the unpunctured set of coded information units to produce a set of coded information units, wherein the at least one of the plurality of subsets that requires a lower probability of bit-error than the other of the plurality of subsets is punctured less than the other of the plurality of subsets.

5. The method of claim 4, wherein the step of coding the information units comprises the steps of:

splitting the information units into a set of codeable information units and a set of uncoded information units;

coding the set of codeable information units to produce a set of coded codeable information units; and

combining the set of coded codeable information units and the set of uncoded information units to produce a set of coded information units.

6. The method of claim 5, wherein the step of combining the set of coded codeable

information units and the set of uncoded information units comprises the steps of:

puncturing the set of coded codeable information units to produce a punctured set of coded codeable information units; and

combining the punctured set of coded codeable information units and the set of uncoded information units to produce a set of coded information units.

7. The method of claim 4, wherein the step of transmitting the interleaved coded information units comprises the steps of:

assigning a symbol to the interleaved coded information units; and

transmitting the symbol.

8. The method of claim 7, wherein the step of transmitting the symbol comprises the steps of:

modulating the symbol onto a waveform to produce a modulated waveform; and

transmitting the modulated waveform.

9. A communication device comprising:

an information source for providing information units to be transmitted;

a processing system, coupled to the information source, capable of receiving the information units, capable of subdividing the information units into a plurality of subsets, wherein the information units subdivided into at least one of the plurality of subsets require a lower probability of bit-error than the information units subdivided into another of the plurality of subsets, capable of reordering information units within each subset to produce a plurality of reordered subsets, wherein the plurality of reordered subsets comprises a first reordered subset and a second reordered subset, capable of interlacing at least one information unit contained in the first reordered subset with at least one information unit contained in the second reordered subset to produce interleaved coded information units, and capable of assigning a symbol to the interleaved coded information units, wherein subdividing by the processing system of the information units comprises coding the information units to produce a set of coded information units and subdividing the set of coded information units into a plurality of subsets, wherein coding by the processing system of the information units to produce a set of coded information units comprises coding information units to produce an unpunctured set of coded information units and puncturing the unpunctured set of coded information units to produce a set of coded information units, and wherein the at least one of the plurality of subsets that requires a lower probability of bit-error than the other of the plurality of subsets is punctured less than the other of the plurality of subsets; and

a transmitter, coupled to the processor, capable of transmitting the symbol.

10. The communication device of claim 9, wherein coding by the processing system of the information units to produce a set of coded information units comprises splitting the information units into a set of codeable information units and a set of uncoded information units, coding the set of codeable information units to produce a set of coded codeable information units, and combining the set of coded codeable information units and the set of uncoded information units to produce a set of coded information units.

11. The communication device of claim 10, wherein combining by the processing system of the set of coded codeable information units and the set of uncoded information units comprises puncturing the set of coded codeable information units to produce a punctured set of information units and combining the punctured set of information units and the set of uncoded information units to produce a set of coded information units.

12. The communication device of claim 9, wherein the processing system comprises a processor.

13. The communication device of claim 9, wherein the processing system comprises:

a coder, wherein the coder codes the information units to produce a set of coded

information units;

a subdividing interleaver coupled to the coder, wherein the subdividing interleaver subdivides the set of coded information units into a plurality of subsets, reorders information units within each subset to produce a plurality of reordered subsets, and interlaces at least one information unit contained in a reordered subset with at least one information unit contained in a different reordered subset to produce interleaved coded information units; and

a symbol coder coupled to the subdividing interleaver, wherein the symbol coder assigns a symbol to the interleaved coded information units.

14. The communication device of claim 13, wherein the subdividing interleaver comprises:

a subdivider, wherein the subdivider subdivides the set of coded information units into a plurality of subsets;

a plurality of interleavers, wherein each interleaver is coupled to the subdivider, and wherein each interleaver reorders information units within a subset to produce a reordered subset; and

an interlacer coupled to each interleaver, wherein the interlacer interlaces at least one information unit contained in a reordered subset with at least one information unit contained in a different reordered subset to produce interleaved coded information units.

15. The communication device of claim 13, wherein the processing system further comprises a puncturer coupled between the coder and to the subdividing interleaver, wherein the puncturer punctures the set of coded information units to produce a punctured set of coded information units, and wherein the subdividing interleaver subdivides the punctured set of coded information units into a plurality of subsets.

16. The communication device of claim 13, further comprising:

a splitter coupled between the information source and the coder, wherein the splitter splits the information units into a set of codeable information units and a set of uncoded information units, and wherein the coder codes the set of codeable information units to produce a set of coded codeable information units; and

a combiner coupled between the coder and the subdividing interleaver, and further coupled to the splitter, wherein the combiner combines the set of coded codeable information units and the set of uncoded information units to produce a set of coded information units.

17. The communication device of claim 16, further comprising:

a puncturer coupled between the coder and the combiner, wherein the puncturer punctures the coded codeable information units to produce a punctured set of coded codeable information units, and wherein the combiner combines the punctured set of coded codeable information units and the set of uncoded information units to produce a set of coded information units.